

DESCRIPTION

The Ellipse® Annular Hot-tap Flanged Flow Meter is a multi-ported, self-averaging differential pressure flow element for saturated and super-heated steam. The Ellipse flow meter is designed with a series of ports facing the upstream velocity pressures and flow sensing ports strategically located ahead of the trailing edge flow separation.

CONFIGURATION

The flow element has a two-piece construction: an elliptical shape and two 100% independent flow sensing chambers. This construction prevents signal degradation and mixing, and does not require dampening hardware or software. The impact velocity sensing holes (high pressure) are located along the leading edge and the true static sensing holes (low pressure) are on the exterior probe side. This does not generate any vortices or vacuum effects that impinge on the static pressure measurement sensing area and has a drag coefficient of 0.32 or less. An identification tag is supplied with specific flow station measurement information, as required.

COMPONENTS

All sensors are furnished with 1/2 in. (12 mm) instrument valves, flanged mounting hardware (with the proper ratings), and ID tag as standard equipment. Available options include integral 3-valve or 5-valve transmitter mount manifold and integral RTD temperature sensor.



FEATURES

- Patented elliptical design
- Single point pipe entry for DP, temperature and static pressure
- No dampening software required
- Low pressure loss (typically 3% of DP in a 12 in. (304 mm) line) due to the patented aerodynamic profile
- NIST traceable calibration, optional independent labs
- Accuracy: $\pm 0.75\%$ of reading, repeatability: $\pm 0.1\%$ of reading
- Turndown Ratio: 17:1; no vacuum effects
- No moving part construction provides long, trouble-free service life
- True static pressure measurement rather than a calculated value
- Overcomes loss of accuracy caused by fluid separation at the sensor body

STANDARD COMPONENTS

Component	Specifications
Head	T-type
Connection	316 SS 1/4 in. or 1/2 in. FNPT
Ellipse Sensor	316/316L SS
Instrument Valves	2 per sensor, 1/4 in. or 1/2 in. CS
ID Tag	316 SS with wire
Sensor Flange	150 lb 316/316L SS
Packing Chamber	CS with molythane or graphite packing gland
Packing Chamber Flange	CS 150 lb with SS cap
Isolation Ball Valve	316 SS, NPT threaded
Nuts and Bolts	CS threaded
Nipples	CS, schedule 40
Diameter	7/8 in., 1-1/4 in. or 2-1/4 in.

OPTIONAL COMPONENTS

Component	Specifications
Rods, Bolts and Nuts	316 SS
Packing Chamber and Flange	316 SS
Spiral Wound Gasket	316 SS
300 lb., 600 lb. or Higher Flange Rating	CS or 316 SS ANSI B16.5
Temperature Port with RTD Output	—
Static Pressure Port	With SS plug

SPECIFICATIONS

Applications	Steam
Pipe Size	2...72 in. (50...1830 mm)
Pressure	800° F (427° C) Maximum
Temperature	800° F (427° C) Maximum
Flow Range	2.6...34,340 GPM
Accuracy	±0.75% of reading
Repeatability	±0.1%
Turndown Ratio	17:1 with no vacuum effect
Reynolds Number	>75,000: Maintains most accurate flow measurements <75,000: Consult factory for estimated results

PART NUMBER MATRIX

Ellipse®

Annular Flanged Hot-tap Steam
7/8 in. DIAMETER

PAHZ -

PIPE SIZE2 in.
2-1/2 in.
3 in.
3-1/2 in.
4 in.
5 in.
6 in.
8 in.
10 in.
12 in.
14 in.
16 in.A
B
C
D
E
F
G
H
I
J
K
L**SCHEDULE**STD
20
30
40
60
80
100
120
140
160
XH
XXH
5S
10S
40S
80SA
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P**PIPE ORIENTATION**Horizontal
VerticalA
B**PROBE MATERIAL**316/316L SS
Monel®
Inconel®
Hastelloy®
Other1
2
3
4
X**INSTRUMENT CONNECTION**1/2 in. NPT
1/2 in. Socket
TT3 (Integral 3-Valve Trans Mount - Max Temp 225° F)
TT5 (Integral 5-Valve Trans Mount - Max Temp 225° F)
(RTD is not available with Integral 5-Valve Manifold. If RTD is required, select
"E" Transmitter Flange Connection and the appropriate manifold valve under
the Instrument Valve section below.)
Transmitter Flange ConnectionA
B
C
D
E**INSERTION MECHANISM / ISOLATION BALL VALVE**150# CS Cage Nipple & Rods
300# CS Cage Nipple & Rods
600# CS Cage Nipple & Rods
150# SS Cage Nipple & Rods
300# SS Cage Nipple & Rods
600# SS Cage Nipple & Rods
150# CS Gear Drive, Cage Nipple & Rods
300# CS Gear Drive, Cage Nipple & Rods
600# CS Gear Drive, Cage Nipple & Rods
150# SS Gear Drive, Cage Nipple & Rods
300# SS Gear Drive, Cage Nipple & Rods
600# SS Gear Drive, Cage Nipple & Rods
NOTE: SS Gear Drive - SS for Housing and Wetted Parts Only
OtherA
B
C
D
E
F
G
H
I
J
K
L
X**PACKING MATERIAL**EPDM (-65...300° F, 400° F in steam)
Viton®/Fluorocarbon (-20...400° F)
Graphoil (1200° F)
Fluoromylite (-65...300° F)
Other1
2
3
4
X**PIPE MOUNTING***A105 CS 3000#
316/316L SS 3000#
Supplied Separately by Preso
Not Required1
2
3
Z**INSTRUMENT VALVE**1/2 in. Gate CS w/Cross
1/2 in. Gate SS w/Cross
Not Required
ONLY AVAILABLE WITH OPTION "E" UNDER INSTRUMENT CONNECTION
Fig x Fig 3-Valve Manifold CS - Max Temp 225° F
Fig x Fig 3-Valve Manifold SS - Max Temp 225° F
Fig x Fig 5-Valve Manifold CS - Max Temp 225° F
Fig x Fig 5-Valve Manifold SS - Max Temp 225° F
Customer Supplied Valve ManifoldA
B
Z
E
F
G
H
I**RTD (Max Temp 480° F, consult factory for higher temp options)**100 Ohm RTD 3-Wire w/Explosion Proof Head
100 Ohm RTD 3-Wire, Integral w/Aluminum Head
Not Required1
2
Z

Stainless Steel ID Tag supplied as standard.

Tag information must be included with order.

NOTE: Make sure that DP and Resonance are within acceptable limits. (See chart in the Ellipse Brochure)

*Double Supports are not recommended for Hot Tap / Wet Tap models.

Ellipse®

Annular Flanged Hot-tap Steam
1-1/4 in. DIAMETER

PAHZ1

PIPE SIZE

12 in.
14 in.
16 in.
18 in.
20 in.
24 in.
30 in.
36 in.
42 in.
48 in.
60 in.
72 in.

A
B
C
D
E
F
G
H
I
J
K
L

SCHEDULE

STD
20
30
40
60
80
100
120
140
160
XH
XXH
5S
10S
40S
80S

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P

PIPE ORIENTATION

Horizontal
Vertical

A
B

PROBE MATERIAL

316/316L SS
Monel®
Inconel®
Hastelloy®
Other

1
2
3
4
X

INSTRUMENT CONNECTION

1/2 in. NPT
1/2 in. Socket
TT3 (Integral 3-Valve Trans Mount - Max Temp 225° F)
TT5 (Integral 5-Valve Trans Mount - Max Temp 225° F)
(RTD is not available with Integral 5-Valve Manifold. If RTD is required, select "E" Transmitter Flange Connection and the appropriate manifold valve under the Instrument Valve section below.)
Transmitter Flange Connection

A
B
C
D
E

INSERTION MECHANISM / ISOLATION BALL VALVE

150# CS Cage Nipple & Rods
300# CS Cage Nipple & Rods
600# CS Cage Nipple & Rods
150# SS Cage Nipple & Rods
300# SS Cage Nipple & Rods
600# SS Cage Nipple & Rods
150# CS Gear Drive, Cage Nipple & Rods
300# CS Gear Drive, Cage Nipple & Rods
600# CS Gear Drive, Cage Nipple & Rods
150# SS Gear Drive, Cage Nipple & Rods
300# SS Gear Drive, Cage Nipple & Rods
600# SS Gear Drive, Cage Nipple & Rods
NOTE: SS Gear Drive - SS for Housing and Wetted Parts Only
Other

A
B
C
D
E
F
G
H
I
J
K
L
X

PACKING MATERIAL

EPDM (-65...300° F, 400° F in steam)
Viton®/Fluorocarbon (-20...400° F)
Graphoil (1200° F)
Fluoromylte (-65...300° F)
Other

1
2
3
4
X

PIPE MOUNTING*

A105 CS 3000#
316/316L SS 3000#
Supplied Separately by Preso
Not Required

1
2
3
Z

INSTRUMENT VALVE

1/2 in. Gate CS w/Cross
1/2 in. Gate SS w/Cross
Not Required
ONLY AVAILABLE WITH OPTION "E" UNDER INSTRUMENT CONNECTION
Flg x Flg 3-Valve Manifold CS - Max Temp 225° F
Flg x Flg 3-Valve Manifold SS - Max Temp 225° F
Flg x Flg 5-Valve Manifold CS - Max Temp 225° F
Flg x Flg 5-Valve Manifold SS - Max Temp 225° F
Customer Supplied Valve Manifold

A
B
Z
E
F
G
H
I

RTD (Max Temp 480° F, consult factory for higher temp options)

100 Ohm RTD 3-Wire w/Explosion Proof Head
100 Ohm RTD 3-Wire, Integral w/Aluminum Head
Not Required

1
2
Z

Stainless Steel ID Tag supplied as standard.
Tag information must be included with order.

NOTE: Make sure that DP and Resonance are within acceptable limits. (See chart in the Ellipse Brochure)
*Double Supports are not recommended for Hot Tap / Wet Tap models.

Ellipse®Annular Flanged Hot-tap Steam
2-1/4 in. DIAMETER

PAHZ2 -

PIPE SIZE12 in.
14 in.
16 in.
18 in.
20 in.
24 in.
30 in.
36 in.
42 in.
48 in.
60 in.
72 in.A
B
C
D
E
F
G
H
I
J
K
L**SCHEDULE**STD
20
30
40
60
80
100
120
140
160
XH
XXH
5S
10S
40S
80SA
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P**PIPE ORIENTATION**Horizontal
VerticalA
B**PROBE MATERIAL**316/316L SS
Monel®
Inconel®
Hastelloy®
Other1
2
3
4
X**INSTRUMENT CONNECTION**1/2 in. NPT
1/2 in. Socket
TT3 (Integral 3-Valve Trans Mount - Max Temp 225° F)
TT5 (Integral 5-Valve Trans Mount - Max Temp 225° F)
(RTD is not available with Integral 5-Valve Manifold. If RTD is required, select "E" Transmitter Flange Connection and the appropriate manifold valve under the Instrument Valve section below.)
Transmitter Flange ConnectionA
B
C
D
E**INSERTION MECHANISM / ISOLATION BALL VALVE**150# CS Cage Nipple & Rods
300# CS Cage Nipple & Rods
600# CS Cage Nipple & Rods
150# SS Cage Nipple & Rods
300# SS Cage Nipple & Rods
600# SS Cage Nipple & Rods
150# CS Gear Drive, Cage Nipple & Rods
300# CS Gear Drive, Cage Nipple & Rods
600# CS Gear Drive, Cage Nipple & Rods
150# SS Gear Drive, Cage Nipple & Rods
300# SS Gear Drive, Cage Nipple & Rods
600# SS Gear Drive, Cage Nipple & Rods
NOTE: SS Gear Drive - SS for Housing and Wetted Parts Only
OtherA
B
C
D
E
F
G
H
I
J
K
L
X**PACKING MATERIAL**EPDM (-65...300° F, 400° F in steam)
Viton®/Fluorocarbon (-20...400° F)
Graphoil (1200° F)
Fluoromyl® (-65...300° F)
Other1
2
3
4
X**PIPE MOUNTING***A105 CS 3000#
316/316L SS 3000#
Supplied Separately by Preso
Not Required1
2
3
Z**INSTRUMENT VALVE**1/2 in. Gate CS w/Cross
1/2 in. Gate SS w/Cross
Not Required
ONLY AVAILABLE WITH OPTION "E" UNDER INSTRUMENT CONNECTION
Fig x Fig 3-Valve Manifold CS - Max Temp 225° F
Fig x Fig 3-Valve Manifold SS - Max Temp 225° F
Fig x Fig 5-Valve Manifold CS - Max Temp 225° F
Fig x Fig 5-Valve Manifold SS - Max Temp 225° F
Customer Supplied Valve ManifoldA
B
Z
E
F
G
H
I**RTD (Max Temp 480° F, consult factory for higher temp options)**100 Ohm RTD 3-Wire w/Explosion Proof Head
100 Ohm RTD 3-Wire, Integral w/Aluminum Head
Not Required1
2
Z

Stainless Steel ID Tag supplied as standard.

Tag information must be included with order.

NOTE: Make sure that DP and Resonance are within acceptable limits. (See chart in the Ellipse Brochure)

*Double Supports are not recommended for Hot Tap / Wet Tap models.

INTENTIONAL BLANK PAGE

INTENTIONAL BLANK PAGE

Control. Manage. Optimize.

Preso and Ellipse are registered trademarks of Badger Meter, Inc. Other trademarks appearing in this document are the property of their respective entities. Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists. © 2021 Badger Meter, Inc. All rights reserved.

www.badgermeter.com